

Section 3

Water Supply Requirements

3.1 Water Production History

Water production is defined for the City of Sunnyside (City) as the total volume of water withdrawn from its ground water wells, as measured by source meters on the wells. The most recent data indicates that in 2002, the total system production was 1,021 million gallons (MG), resulting in an average daily production of 2.80 million gallons per day (MGD). The City's production history for the past six years is presented in Tables 3-1 and 3-2. Table 3-1 presents the City's water production since 1997. The data shows that over the last six years, the average per capita demand is 200 gallons per day (gpd), which is used in the demand forecast. The average peaking factor, which is the maximum day demand (3,057 gpm) divided by the average day demand (1,895 gpd) over the last six years, is 1.61. Using daily average and peak hour demands from 2000 to 2002, the peak hour factor was calculated at 1.59.

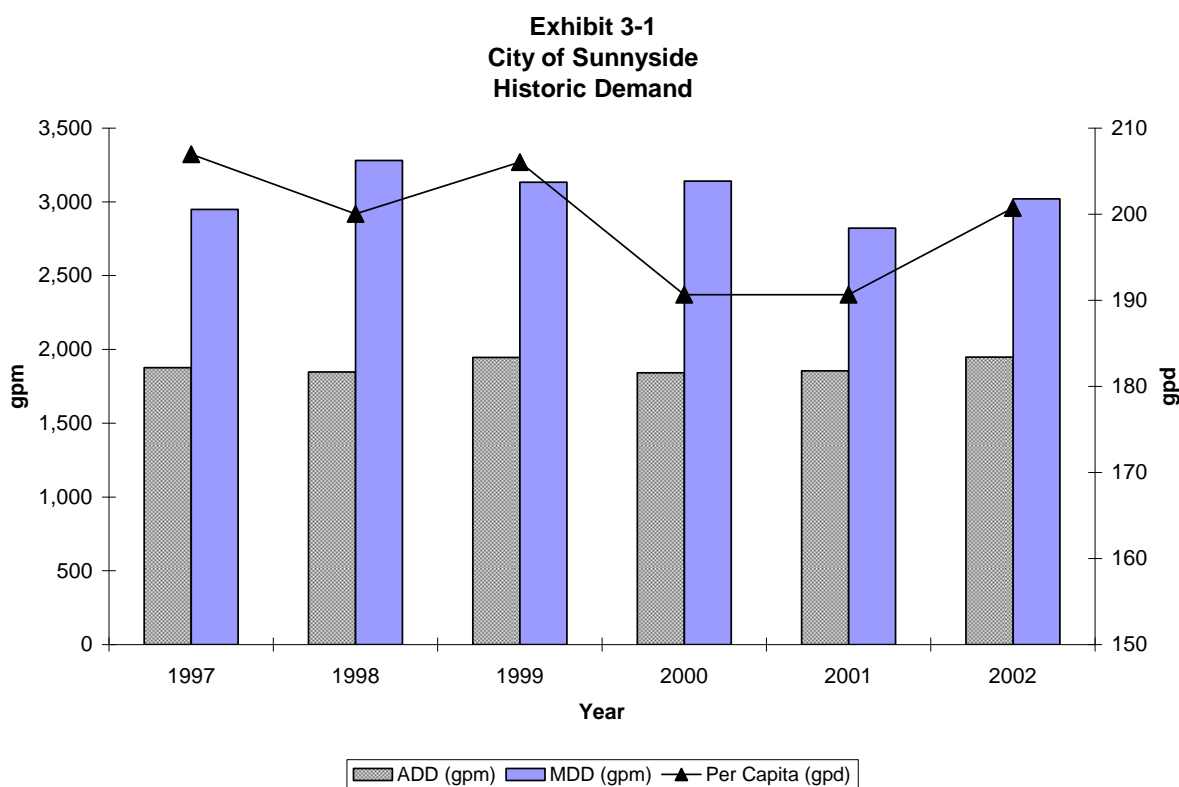
Table 3-1 City of Sunnyside Population and Water Production History								
Year	Population	Daily Average		Max Day Day (gpm)	Min Day Day (gpm)	Peak Hour Demand (gal)	Per Capita Demand	
		(mgd)	(gpm)				(gpd)	(gpm)
1997	13,060	2.70	1,877	2,948	940	n/a	206.97	0.14
1998	13,304	2.66	1,848	3,280	669	n/a	200.02	0.14
1999	13,603	2.80	1,947	3,134	421	n/a	206.06	0.14
2000	13,905	2.65	1,841	3,140	995	188,402	190.65	0.13
2001	14,010	2.67	1,855	2,822	1029	169,260	190.65	0.13
2002	13,970	2.80	1,947	3,020	921	181,140	200.72	0.14
Average		2.72	1,886	3,057	829	179,600	199	0.14

The peak hour factor is lower than maximum day peaking factor. Because of diurnal water use patterns, the peak hour factor is expected to be greater than maximum day peaking factor. As such, Sunnyside relied on DOH's Water System Design Manual (2001), Equation 5-3, to calculate peak hour factor. Using ERU count and maximum day demand for 2003 (see Table 3-6), Sunnyside calculated a peak hour factor of 2.66. This factor is used throughout this document to represent Sunnyside's peak hour factor.

Table 3-2 summarizes the total production history of each of the City's wells from 1997 to 2002.

Table 3-2 Summary of Water Production History by Well (Million Gallons)						
Well No.	1997	1998	1999	2000	2001	2002
4	24.0	5.2	0.0	1.5	0.0	0.0
5	302.2	159.0	132.2	89.1	0.1	0.1
6	154.9	201.9	60.7	32.1	4.7	19.0
7	155.6	190.2	2.0	1.3	270.9	339.9
8	356.5	330.5	311.2	312.9	328.6	322.8
9	0.0	100.4	522.0	543.4	370.9	338.9

Exhibit 3-1 graphically shows the change in average and maximum daily demand and per capita demand since 1997.



3.2 Metered Demand

Customers of the City are categorized into four main customer categories for purposes of billing. These are residential, commercial, public authority, and interdepartmental. Definitions for these customer classes are as follows:

- Residential: Single and multi-unit residential services
- Commercial: non-residential, commercial and industrial services
- Public Authority: includes schools and Sunnyside Housing Authority
- Interdepartmental: includes City departments such as fire, parks, streets, water, and sewer

A summary of the annual demand for each of these customer classes is presented in Table 3-3 for the periods when data was available. This data was obtained from the City's billing system. It should be noted from this table that the annual volumes derived from the billing system are different than those from the production well meters. Furthermore, there is likely an error in the billing records for the residential demand in year 2002 since the demand is approximately three times the demands from previous years without an identified reason, and the total demand that year exceeds production by nearly one million gallons. Nevertheless, it should be noted that the residential and commercial demands each account for approximately 45% of the total demand.

Table 3-3 Summary of Annual Demand by Customer Class (Million Gallons)				
Year	Residential	Commercial	Public Authority	Interdepartmental
2000	474.3 (42%)	551.7 (49%)	59.0 (5.5%)	39.8 (3.5%)
2001	477.3 (45%)	478.0 (45%)	58.6 (5.5%)	43.8 (4.5%)
2002	1,436.1 (72%)	445.3 (23%)	55.4 (2.8%)	43.3 (2.2%)

Prior to 2000, City of Sunnyside records indicate that residential use accounts for about 50 percent of the water consumed, not including unaccounted for water. Normally, as population increases, as it has in Sunnyside, the total residential use would increase. However, the residential use in terms of per capita demand has continued to level off primarily as a result of more conservation efforts. Furthermore, as illustrated in Exhibit 3-1, total water use has not risen significantly in the City over the last six years.

For water demand planning purposes, it is often informative to identify the large users within the commercial customer category, as their consumption patterns will typically be very different from those of other customers.

The top ten commercial or non-residential users in the City during 2002 have been identified and are listed in Table 3-4. In 2002, the ten largest users accounted for approximately 22 percent of total production or 224.6 million gallons. This is equal to an average of 615,000 gpd. The City and Yakima County have not identified any new potential large water users that may have a significant impact on the water system at this time.

Table 3-4
Top 10 Non-Residential Water Users

Name	Average Annual Use (gpd)	Average Annual Use (mgd)	Percentage of Year 2002 Production
Westfarm Foods	262,418	95.8	9.4
Independent Food Processors	118,335	43.2	4.2
Valley Processing	47,978	17.5	1.7
Johnson Concentrates	44,240	16.1	1.6
Valley Processing	37,428	13.7	1.3
Parkland Mobile Home Park	30,322	11.1	1.1
Valley Processing	25,575	9.3	0.9
Johnson Cold Storage	17,971	6.6	0.6
South Hill Park	16,599	6.1	0.6
Lincoln School	14,401	5.3	0.5
Total	615,267	224.6	22.0

**2002 total production is 1020.7 MG*

3.3 Water Demand Forecast

As the City's population grows and commercial/industrial development occurs, demands on the water system will increase accordingly. The results of the population forecast (see Section 2.3) are used in further areas of this planning effort, including analysis of the existing system and development of the capital improvement plan (CIP).

The method of forecasting demand involves multiplying the projected population of the City by the per capita water production factor. As described in Section 2.3, the population projection assumed a 2.5 percent growth rate over the planning period. This resulted in a projected 2024 served population of 24,018. The water production factor (average day demand of 200 gpd per capita) was calculated as the average per capita water usage for years 1997-2002 (see Table 3-1). This number is within the range of typical usage rates, despite including the industrial/commercial users and despite being in a relatively dry climate. Considering residential only (assuming 50 percent of demand) the per capita demand is reduced to 100 gpd per person. The average day demand is multiplied by the peaking factor of 1.6 to calculate the maximum day demand for the system. Average day demand is also multiplied by 2.66 to obtain the peak hour demand.

Since Sunnyside is a dominant economic center to the area, Sunnyside believes that the City's population growth is driven by growth in the local economy; this correlation between population increases and economic activity is much looser for water providers who serve "bedroom communities" which are typically comprised mainly of residential customers. Therefore, the demand forecast uses population increases as a means to forecast demand for all customer classes, including non-residential customer classes. In addition, since the City does not anticipate any new large non-residential customers or significant expansions to existing non-residential customers over the 20 year planning period, demands above the forecasted demands for the non-residential customer class (as presented in Table 3-6) are not predicted.

The number of equivalent residential units (ERUs) for the City's system is calculated based on the Washington State Department of Health (DOH) Water System Design Manual Chapter 6. Starting with 4,254 ERU for 2003, an annual growth rate of 2.5% was applied. This growth rate is the same growth rate applied to current population in order to forecast future population. Because a meter count for 2003 was unavailable, ERUs for 2003 were calculated using meter counts from August 2004. The grand total of 4,786 ERUs for mid-year 2004 were reduced by 1.25% (half of the annual growth rate of 2.5%) to obtain ERU's for 2003. Total ERUs for August 2004 are shown in Table 3-5.

Table 3-5							
ERU Conversion for August 2004 Meter Count							
Meter Size (in.)	Customer Classes				ERU Conversion		
	Residential	Public	Interdepartmental	Commercial	Total	Factor	Total ERUs
3/4 and 5/8	2,262	4	13	217	2,496	1	2,496
1	77	6	8	78	169	2.5	423
1.5	11	2	5	43	61	5	305
2	16	15	8	45	84	8	672
3	4	7	1	9	21	15	315
4	2	5	3	5	15	25	375
6	2	0	1	1	4	50	200
Grand Total							4,786

The results of the demand projection for the next 20 years (starting from 2003) are presented in Table 3-6 along with the projected ERUs over this planning period. It should be noted that the demand projections shown in Table 3-6 do not include the projected water conservation savings. Based on the water conservation program described in Section 4, it is assumed that demands shown in Table 3-5 will be reduced by 2.5 percent over six years (2010) and by 5 percent over 20 years (2024). The modified demand projections are quantified further in Section 7. Exhibit 3-2 shows the plot of the projected average day and maximum day demands over the planning period.

Table 3-6
Demand Projections for Year 2003 to 2024

Year	Population	ERU ⁽³⁾	Demand(1) (gpd)			Demand (2) (gpd)	
			ADD	MDD	PHD	ADD	MDD
2003	14,300	4,726	2,860,000	4,604,600	7,607,600	1,430,000	2,302,300
2004	14,658	4,845	2,931,600	4,719,876	7,798,056	1,465,800	2,359,938
2005	15,024	4,966	3,004,800	4,837,728	7,992,768	1,502,400	2,418,864
2006	15,400	5,090	3,080,000	4,958,800	8,192,800	1,540,000	2,479,400
2007	15,785	5,217	3,157,000	5,082,770	8,397,620	1,578,500	2,541,385
2008	16,179	5,348	3,235,800	5,209,638	8,607,228	1,617,900	2,604,819
2009	16,584	5,481	3,316,800	5,340,048	8,822,688	1,658,400	2,670,024
2010	16,998	5,618	3,399,600	5,473,356	9,042,936	1,699,800	2,736,678
2011	17,423	5,759	3,484,600	5,610,206	9,269,036	1,742,300	2,805,103
2012	17,859	5,903	3,571,800	5,750,598	9,500,988	1,785,900	2,875,299
2013	18,305	6,050	3,661,000	5,894,210	9,738,260	1,830,500	2,947,105
2014	18,763	6,201	3,752,600	6,041,686	9,981,916	1,876,300	3,020,843
2015	19,232	6,357	3,846,400	6,192,704	10,231,424	1,923,200	3,096,352
2016	19,713	6,515	3,942,600	6,347,586	10,487,316	1,971,300	3,173,793
2017	20,206	6,678	4,041,200	6,506,332	10,749,592	2,020,600	3,253,166
2018	20,711	6,845	4,142,200	6,668,942	11,018,252	2,071,100	3,334,471
2019	21,228	7,016	4,245,600	6,835,416	11,293,296	2,122,800	3,417,708
2020	21,759	7,192	4,351,800	7,006,398	11,575,788	2,175,900	3,503,199
2021	22,303	7,372	4,460,600	7,181,566	11,865,196	2,230,300	3,590,783
2022	22,861	7,556	4,572,200	7,361,242	12,162,052	2,286,100	3,680,621
2023	23,432	7,745	4,686,400	7,545,104	12,465,824	2,343,200	3,772,552
2024	24,018	7,938	4,803,600	7,733,796	12,777,576	2,401,800	3,866,898

Note: 2002 is the last year with actual population numbers for the City of Sunnyside at the time of this report.

This table shows the projected populations from 2004 to 2024 (20-year planning period).

(1) Demand includes estimate for commercial/industrial users

(2) Demand shown represents only the residential portion and is reduced by 50% from the total demand, which the estimated use by the commercial/industrial users.

(3) Calculated by applying a 2.5% annual growth rate to 2003 ERUs.

Exhibit 3-2
Projected 20-Year Demand
City of Sunnyside

